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(54) Dust respirator

(57) A respirator has a sheet of filter material centrally folded to form upper and lower opposed faces (14) (16), at least two horizontal pleats (18) central to the opposed faces and at least one additional horizontal pleat (20) (22) in each of said opposed faces wherein the central pleat (18) together with pleats (20) (22) form a self-supporting pocket; deformable strip (28) extending at least partially across the upper opposed face (14) conforming to the nasal contour of the wearer, and attachment means (32) for releasably securing the mask to the face of the wearer.

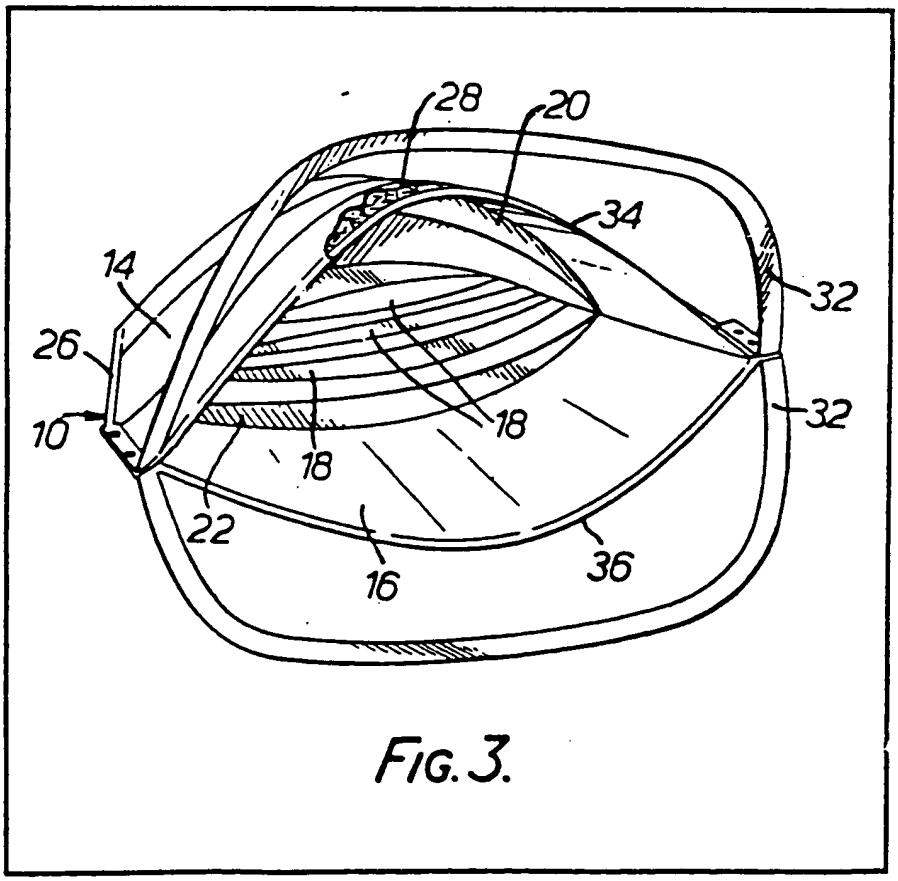

FIG. 3.

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

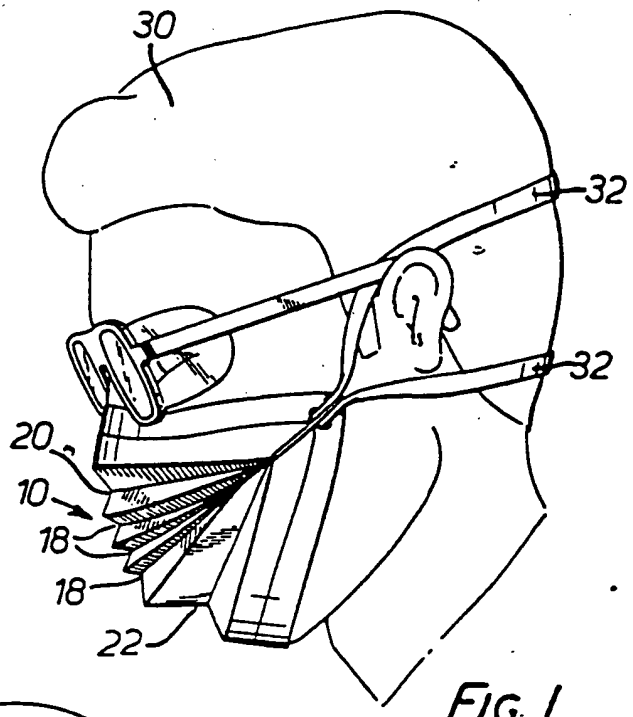

FIG. 1.

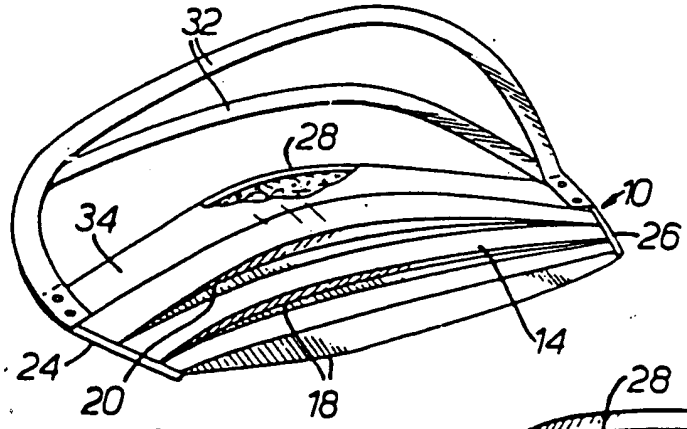

FIG. 2.

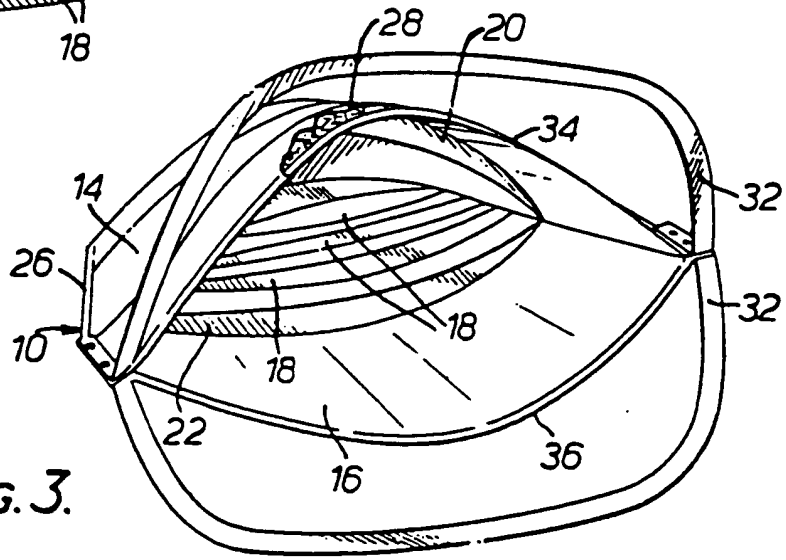

FIG. 3.

SPECIFICATION

Dust respirator

This invention relates to disposable dust respirators to provide workers with respiratory protection against pneumoconiosis and fibrosis producing dusts. More particularly, the invention is directed to a respirator of this type characterised by its self-opening design, extending away from the mouth when open, ready disposability, low cost, and expanded surface area for extended life.

Filter masks have historically been used to reduce the dispersion of micro-organizms from the respiratory system of medical personnel involved in procedures requiring aseptic conditions, for example, surgery. These masks generally tend to collapse about the nose and mouth of the wearer upon inhalation, particularly after a relatively short period of use when the filter medium has become dampened through the moisture in the exhalant of the wearer. This collapse about the nose and mouth of the wearer is not only uncomfortable and bothersome, but it reduces the filtering efficiency of the mask by forcing a greater volume of air through the smaller surface area of the mask. Also, these masks must be punched or pushed open by the sophisticated doctor or nurse so as to be effective. However, a surgical operation is generally of relative short duration and these drawbacks have not been found too detrimental to use of such masks. Examples of such masks are disclosed in U.S.Patents 3 971 369, 3 884 227, 3 736 928, 3 613 678 and others, such as Re. 24 549.

The recent requirements by the National Institute for Occupational Safety and Health (NIOSH) for dust respirators for industrial workers who are exposed to pneumoconiosis and fibrosis producing dusts has meant that relatively unsophisticated people must use masks for extended periods of time. As such, the drawbacks of the previous surgical masks become important and must be overcome so that a worker will not endanger himself by not wearing his mask. One attempt at such a mask is disclosed in U. S. Design Patent 249 072. However, this mask must still be punched open to be useful.

In accordance with the present invention there is provided a dust respirator adapted to be worn upon the face of a wearer, the respirator comprising:

a. an initially generally planar surface of filter medium, having a vertical and a horizontal dimension, being centrally folded in the horizontal direction to form upper and lower opposed faces; having at least two horizontal pleats essentially central to said opposed faces to foreshorten the filter medium in the vertical dimension, having at least one additional horizontal pleat in each of said opposed faces wherein said central pleat together with said pleats in the opposed faces form a self-supporting pocket, wherein the central pleats are shorter in the horizontal dimension relative to the pleats in the opposed faces which are each shorter in the horizontal dimension relative to the maximum dimension of the filter medium, having the opposed faces joined vertically at the extreme ends of each of said pleats;

b. a yieldable deforming conforming means horizontally extending at least partially across the upper opposed face capable of conforming the opposed face to the nasal contour of the wearer; and

c. attachment means for releasably securing the respirator upon the face of the wearer.

The present invention also provides a dust respirator having a generally boat-shaped configuration and adapted to fit over the mouth and nose of a wearer,

the bottom of the respirator having at least two pleats and each of the sides having at least one pleat with the folded edge of the pleat facing the wearer,

the sides of the respirator being joined so that the two edges resulting therefrom slope towards each other to make the pleats open to expose a greater surface area of the respirator and to maintain the respirator surface away from the face of the wearer,

means for conforming the respirator to the nasal contour of the wearer, and

means for holding the respirator to the head of the wearer.

The advantage of having at least two central pleats (and preferably three such pleats) compared with a single central pleat is that it enables the mask to be more readily self-opening, more comfortable to wear and more durable.

A preferred embodiment of the invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a view of a dust respirator as it appears when worn.

Figure 2 is a perspective view seen from the bottom of the dust respirator of Fig. 1 in its partially open state with the top portion thereof shown partly broken away and in section.

Figure 3 is a perspective view of the dust respirator of Fig. 1 in its open state, as seen from the top.

Referring to the embodiment shown in Figs. 1 to 3, the dust respirator is shown generally at 10 and is fabricated from a generally planar segment of filter medium having a horizontal and a vertical dimension. The filter medium is folded in the horizontal direction to form opposed faces 14 and 16, and to have at least two pleats 18 central to the opposed faces, which foreshortens the filter medium in the vertical dimension. Preferably, there are three central pleats 18, as shown. Each of the

opposed faces 14 and 16 has at least one additional pleat 20 and 2 which further foreshortens the filter medium in the vertical dimension. All of the pleats are laterally extending and are joined at the borders 24 and 26 of the dust respirator by a suitable means, such as by heat sealing.

The central pleats are all essentially of the same length, although when there are three such pleats (the preferred arrangement), the middle pleat will inherently be slightly shorter than the outer pair. On the other hand, the central pleats 18 are shorter in the horizontal direction than the additional pleats 20 and 22, which, in turn, are shorter in the horizontal direction than the maximum horizontal dimension of the filter medium. This arrangement means that the borders 24 and 26 are tapered away from the opening of the respirator. As a result of this arrangement of pleats 18,20 and 22, the respirator is self-expanding upon opening and there is no need for the wearer to 'punch out' a breathing pocket each time the respirator is used.

The upper border of the filter medium includes a conventional yieldably deformable strip 28 which serves to selectively conform the upper border of the filter medium to the nasal contour of wearer 30. As shown in Figs. 2 and 3, the strip 28 is preferably embedded in opposed face 14 though it may be on the surface thereof. Preferably the strip is a wire reinforced plastic strip.

The respirator 10 is provided with attachment means 32 for releasably securing it to the wearer 30. Preferably, elastic straps are used to provide comfort around the ears of the wearer.

The external configuration of respirator 10 is preferably completed by double foldovers 34 and 36 across the lower and upper borders respectively.

Referring now more particularly to Fig. 3, the dust respirator 10 is self-expanding into its open useable state by merely pulling the upper and lower borders of the respirator. When the respirator is not in use, it is readily stored in its original flat configuration.

As a result of the design of the respirator, it is possible to have a relatively larger filter surface area which is available for filtration without the need for the wearer to do other than pull the elastic straps and place the device over his mouth and nose, while at the same time being collapsible into a relatively confined dimensional configuration for ease of storage, shipment, handling, etc.

Preferably the filter medium 12 has an original surface area of about 70–75 square inches so as to provide a respirator having sufficient service life to satisfy the requirements of the U.S. National Institute for Occupational Safety and Health.

CLAIMS

1. A dust respirator adapted to be worn upon the face of a wearer, the respirator comprising:

a. an initially generally planar surface of filter medium, having a vertical and a horizontal dimension, being centrally folded in the horizontal direction to form upper and lower opposed faces; having at least two horizontal pleats essentially central to said opposed faces to foreshorten the filter medium in the vertical dimension, having at least one additional horizontal pleat in each of said opposed faces wherein said central pleat together with said pleats in the opposed faces form a self-supporting pocket, wherein the central pleats are shorter in the horizontal dimension relative to the pleats in the opposed faces which are each shorter in the horizontal dimension relative to the maximum horizontal dimension of the filter medium, having the opposed faces joined vertically at the extreme ends of each of said pleats;

b. a yieldable deforming conforming means horizontally extending at least partially across the upper opposed face capable of conforming the opposed face to the nasal contour of the wearer; and

c. attachment means for releasably securing the respirator upon the face of the wearer.

2. A dust respirator according to Claim 1, wherein there are three central pleats.

3. A dust respirator according to Claim 1 or Claim 2 wherein each of the oppose faces has one pleat.

4. A dust respirator according to any preceding claim, wherein the filter medium has an initial surface area of about 70–75 square inches.

5. A dust respirator according to any preceding claim wherein the yieldable deforming conforming means is embedded in the opposed face.

6. A dust respirator according to any preceding claim wherein the joining of the opposed faces is a heat seal.

7. A dust respirator having a generally boat-shaped configuration and adapted to fit over the mouth and nose of a wearer,

the bottom of the respirator having at least two pleats and each of the sides having at least one pleat with the folded edge of the pleat facing the wearer,

the sides of the respirator being joined so that the two edges resulting therefrom slope towards each other to make the pleats open to expose a greater surface area of the respirator and to maintain the respirator surface away from the face of the wearer,

means for conforming the respirator to the nasal contour of the wearer, and

means for holding the respirator to the head of the wearer.

8. A dust respirator according to Claim 7, wherein the bottom has three pleats.

9. A dust respirator according to Claim 1

or Claim 7 and substantially as hereinbefore described with reference to the accompanying drawings.

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